

development which was then termed a "semi-pupa." It is doubtful if larvæ assuming this state ever successfully develop into adults.

The accompanying illustration shows the dorsal view of the glossy, brown larvæ (enlarged five diameters) a lateral view of the semi-pupa or prothetelic state (four diameters), and a natural size view of the first lot of larvæ.

ASILIDS AND THEIR PREY.

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While collecting insects during the summers of 1912-13 at Southbridge, Mass., I was attracted by the predaceous habits of certain Asilidæ and the apparent partiality of some of the species for Hymenoptera, while others, as for example, *Asilus sericeus*, would almost invariably seize a Lepidopterous insect. To ascertain more fully the feeding habits of the species, I made a special collection of Asilidæ with their prey.

Asa Fitch in his Ninth Report, page 251, pl. 4, fig. 7, refers to what is now called *Promachus fitchii* O. S., as the "Nebraska Bee-killer"—*Trupanea apivora*, stating that he had received it from Nebraska where it was destructive to the honey bee and also to the rose bug. As to robber-flies killing bees, I have not seen them do much damage, but I have never observed them closely in the vicinity of hives. Most of the bees taken were in the field, probably at quite a distance from any apiary. They might, however, become injurious if abundant near a hive, for they always capture their prey on the wing and would undoubtedly seize indiscriminately any bee that came within their range. As the various species of *Vespa* and other Hymenoptera were more plentiful in the fields than the honey bee, these fell victims to the ravenous appetites of the Asilids which preyed also on members of their own family and, indeed, even on those of the same species.

As far as my observations go, there are very few insects that will attack robber-flies. I have seen a species of *Crabro* sting and

carry off a male *Erax æstuans*, and have also seen hornets kill small Asilids. Spiders are, however, formidable enemies of robber-flies. I have taken three *Proctocanthus philadelphicus* from webs of spiders; one from an Epeirid web and two from a web of *Agalena*; six *Deromyia umbrina* from *Argiope riparia*, *Dasyllis thoracica* from *Theridium tepidarorium*, and many small Asilids and *Erax æstuans* from *Theridium*, *Epiera* and *Linyphia*.

I am greatly indebted to Mr. C. W. Johnson of the Boston Society of Natural History for many suggestions and kind assistance in naming the insects included in the following lists.

LIST OF INSECTS AND NUMBER OF SPECIMENS TAKEN FROM ASILIDS.

Asilus sericeus Say.

(Lepidoptera)

1 <i>Euvanessa antiopa</i>	1 <i>Archytas analis</i>
1 <i>Satyrus alope</i>	1 <i>Eudamus tityrus</i>
2 <i>Colias philodice</i>	1 <i>Noctua</i> sp.
2 <i>Chrysophanus hypophlæus</i>	

(Diptera)

Asilus lecythus Walker.

(Odonata)

1 *Enallagma* sp?

Asilus orphne Walker.

(Hemiptera)

1 *Typhlocyba* sp?

Asilus notatus Wiedemann.

(Diptera)

2 *Metopia leucocephala* 2 *Sarcophaga* sp?

(Neuroptera)

1 *Chrysopa* sp?

Asilus erythrocnemius Hine.

(Hymenoptera)

1 *Formica* sp? ♀

Asilus latipennis Hine ♂.

(Diptera)

1 *Asilus latipennis* ♂

Proctacanthus philadelphicus Macquart.

(Hymenoptera)

10 <i>Apis mellifica</i>	3 <i>Vespa maculata</i>
7 <i>Bombus vagans</i>	5 <i>V. arenaria</i>
5 <i>B. impatiens</i>	2 <i>V. vulgaris</i>
2 <i>B. perplexus</i>	25 <i>V. diabolica</i>
1 <i>B. affinis</i>	17 <i>V. germanica</i>
1 <i>B. bimaculatus</i>	9 <i>V. sp?</i>
1 <i>B. sp?</i>	1 <i>Ancistrocerus capra</i>
1 <i>Melissodes dentiventris</i>	1 <i>Gorytes simillimus</i>
1 <i>Andrena rubicula</i>	4 <i>Aphilanthops frigidus</i>
2 <i>A. sp?</i>	1 <i>Ccropales fraterna</i>
2 <i>Halictus nymphacorum</i>	1 <i>Psammochares biguttata</i>
2 <i>H. lerouxii</i>	1 <i>P. cylindrica</i>
2 <i>H. sp?</i>	1 <i>P. sp?</i>
1 <i>Sphécodes sp?</i>	4 <i>Tiphia inornata</i>
1 <i>Crabro sczmaculatus</i>	3 <i>T. transversa</i>
1 <i>Tachysphex sp?</i>	3 <i>T. sp?</i>
1 <i>Sceliphrou cecentarium</i>	1 <i>Camponotus pennsylvanicus</i> ♀
6 <i>Formica fusca</i> and vars? ♀ ♂	1 <i>Ichneumon trizonatus</i>
1 <i>Lasius umbratus</i> ♀	3 <i>I. creperus</i>
2 <i>Myrmica rubra</i> ♀	1 <i>I. montanus</i>
5 <i>Pimpla pedalis</i>	1 <i>I. parvus</i>
1 <i>Anomalon sp?</i>	1 <i>I. latus</i>
1 <i>Pamphilus sp?</i>	2 <i>I. Iustabilis</i>
	9 <i>I. sp?</i>

(Diptera)

2 <i>Pachyrhina sp?</i>	3 <i>Deromyia winthemi</i>
2 <i>Tabanus microcephalus</i>	2 <i>Eristalis tenax</i>
4 <i>Pangonia rasa</i>	1 <i>Chrysotoxum derivatum</i>
1 <i>Chrysops univittatus</i>	2 <i>Tachina sp?</i>
1 <i>Psilocephala hæmorroidalis</i>	4 <i>Ptilodexia tibialis</i>
1 <i>Asilus notatus</i>	1 <i>Othalia cornicina</i>
1 <i>A. sadytes</i>	2 <i>Sarcophaga sp?</i>
1 <i>Erax æstuans</i>	1 <i>Phormia regina</i>
1 <i>Proctacanthus philadelphicus</i> ♂	1 <i>Muscina stabulans</i>
(this was killed by a large ♂)	1 <i>Pollenia rudis</i>
4 <i>Deromyia umbrina</i> ♂ ♀	1 <i>Eurosta comma</i>

(Lepidoptera)

1 <i>Chrysophanus hypophlæus</i>	1 <i>Feltia herilis?</i>
1 <i>Pamphila hianna</i>	1 <i>Crambus leachcllus</i>

(Coleoptera)

3 <i>Cincindela punctulata</i>	1 <i>Onthophagus hecate</i>
5 <i>Aphodius fimetarius</i>	1 <i>Balanius unifornis</i>

(Hemiptera)

1 <i>Ceresa biceros</i>	1 <i>Banasa dimidiata</i>
1 <i>Jassus olitorius</i>	1 <i>Euschistus fissilis</i>
1 <i>Alydus eurinus</i>	1 <i>E. tristigmus</i>
1 <i>Campylenchia curvata</i>	1 <i>Stictocephala</i> sp.?
1 <i>Eurygaster alternata</i>	

(Orthoptera)

1 <i>Camnula pelucida</i>	1 <i>Nemotettix cristattus</i>
6 <i>Orphulella speciosa</i>	

(Odonata)

1 <i>Enallagma</i> sp?	1 <i>Sympetrum rubicundulum</i>
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Erax æstuans Linne.

(Hymenoptera)

1 <i>Fomica fusca</i> var?	1 <i>Ichneumon</i> sp?
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(Diptera)

1 <i>Atomosia puella</i>

(Coleoptera)

1 <i>Melanotus</i> sp?	1 <i>Carpophilus hemipterus</i>
1 <i>Pachybrachys atomarius</i>	

(Hemiptera)

1 <i>Carynota muskokensis</i>

Erax rufibarbis Macquart.

(Hymenoptera)

1 <i>Halictus nymphæorum</i>	1 <i>Pimpla pedalis</i>
1 <i>Ichneumon</i> sp?	

(Diptera)

1 <i>Eristalis tenax</i>	1 <i>Stomoxys calcitrans</i>
1 <i>Sarcophaga</i> sp?	1 <i>Peleteria robusta</i>
1 <i>Muscina</i> sp?	

(Lepidoptera)

1 <i>Crambus</i> sp?

(Hemiptera)

1 <i>Tomaspis bicincta</i>

Promachus bastardi Macquart.

(Hymenoptera)

1 <i>Halictus ligatus</i>	1 <i>Ambyteles rubivagus</i>
2 <i>H. nymphacorum</i>	1 <i>Ichneumon flavizonatus</i>
1 <i>H. lerouzi</i>	1 <i>I. latus</i>
1 <i>H. sp?</i>	1 <i>I. sp?</i>
3 <i>Vespa diabolica</i>	2 <i>Pimpla pedalis</i>

(Diptera)

1 <i>Asilus orphne</i>	1 <i>Sarcophaga sp?</i>
1 <i>A. novæ-scotiæ</i>	

(Coleoptera)

1 <i>Hoplia equina</i>	1 <i>Limonius sp?</i>
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(Hemiptera)

1 <i>Lygus pratensis</i>

Promachus fitchii Osten Saken

(Hymenoptera)

2 <i>Apis mellifica</i>	1 <i>Aphlanthops frigidus</i>
1 <i>Bombus vagans</i>	2 <i>Tiphia inornata</i>
2 <i>Andrena nubicula</i>	1 <i>T. transversa</i>
1 <i>Megachile avara?</i>	1 <i>T. sp?</i>
2 <i>Halictus ligatus</i>	8 <i>Formica fusca</i> and vars? ♀ ♂
9 <i>H. nymphæorum</i>	1 <i>Ichneumon trizonatus</i>
2 <i>H. provancheri</i>	1 <i>I. rubivagus</i>
7 <i>H. sp?</i>	1 <i>I. comes</i>
1 <i>Vespa diabolica</i>	2 <i>I. sp?</i>
2 <i>Augochlora sp?</i>	2 <i>Pimpla pedalis</i>
1 <i>Ancistrocerus capra</i>	

(Diptera)

1 <i>Tabanus microcephalus</i>	1 <i>Promachus bastardi</i>
1 <i>Asilus snowii</i>	2 <i>Atomosia puella</i>
2 <i>A. notatus</i>	1 <i>Mesogramma marginatus</i>
7 <i>Erax æstuans</i> ♀ ♂	1 <i>Syrphus sp?</i>
1 <i>Promachus fitchii</i>	

(Coleoptera)

1 <i>Cicindela punctulata</i>	2 <i>Hoplia equina</i>
1 <i>Amara vida</i>	1 <i>Macroductylus subspinosus</i>
1 <i>Hapladrus femoratus</i>	1 <i>Onthophagus hecate</i>
1 <i>Elatér sp?</i>	7 <i>Aphodius fimetarius</i>
2 <i>Melanotus sp?</i>	

(Lepidoptera)

- | | |
|----------------------------------|-----------------------|
| 1 <i>Chrysophanus hypophlæus</i> | 1 <i>Pyrausta</i> sp? |
| 1 <i>Pamphila peckius</i> | |

(Hemiptera)

- | | |
|-----------------------------|---------------------------------|
| 1 <i>Corizus</i> sp? | 1 <i>Eurygaster alternatus</i> |
| 1 <i>Lygus pratensis</i> | 1 <i>Chlorochroa persimilis</i> |
| 1 <i>Emblethis vicarius</i> | 1 <i>Euschistus fissilis</i> |

Dasyllis thoracica Fabricius.

(Hymenoptera)

- 1 *Halictus lerouxii*

(Coleoptera)

- | | |
|------------------------------------|---------------------------------|
| 1 <i>Macroductylus subspinosus</i> | 1 <i>Glyptoscelis pubescens</i> |
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Dasyllis posticata Say.

(Coleoptera)

- 2 *Aphodius fimetarius*

Dasyllis flavicollis Say.

(Coleoptera)

- 1 *Telephorus carolinensis*

Cyrtopogon marginalis Loew

(Trichoptera)

- 1 *Trichopterid*

(Hemiptera)

- 1 Winged aphid

Deromyia umbrina Loew.

(Hymenoptera)

- | | |
|-----------------------------|---------------------------------|
| 10 <i>Apis mellifica</i> | 2 <i>Crabro interruptus</i> |
| 1 <i>Bombus impatiens</i> | 1 <i>Ammophila</i> sp? |
| 2 <i>B. fervidus</i> | 1 <i>Sceliphron cementarium</i> |
| 2 <i>B. vagans</i> | 1 <i>Bembidula ventralis</i> |
| 1 <i>Andrena</i> sp? | 1 <i>Campoplex</i> sp? |
| 1 <i>Halictus</i> sp? | 1 <i>Anthophilus bilunatus</i> |
| 1 <i>Colletes americana</i> | 1 <i>Taxonus nigrisoma</i> |
| 11 <i>Vespa diabolica</i> | 1 <i>Exochilium nigrovarium</i> |
| 2 <i>V. vulgaris</i> | 4 <i>Ichneumon</i> sp? |
| 2 <i>V. arenaria</i> | 2 <i>I. saucius</i> |
| 1 <i>Gorytes simillimus</i> | 3 <i>Pimpla pedalis</i> |
| 1 <i>Cerceris deserta</i> | 1 <i>Thyreodon morio</i> |

(Diptera)

3 <i>Pangonia rasa</i>	1 <i>Erax æstuans</i>
1 <i>Asilus sericeus</i>	1 <i>Leptogaster badius</i>
1 <i>A. nova-scotiæ</i>	1 <i>Eristalis tenax</i>
1 <i>A. snowii</i>	

(Coleoptera)

1 *Trichius affinis*

(Hemiptera)

1 *Ceresa taurina*

Deromyia winthemi Wiedemann.

(Hymenoptera)

1 <i>Halictus nymphæorum</i>	1 <i>Campoplex</i> sp?
1 <i>Evania appendigaster</i>	1 <i>Ichneumon w-album</i>
1 <i>Formica fusca</i> var?	1 <i>Anomalon</i> sp?
1 <i>Augochlora similis</i>	

Ceraturgus cruciatus Say.

(Hymenoptera)

2 <i>Formica fusca</i> ♀	1 <i>Formica</i> sp? ♀
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(Coleoptera)

4 <i>Aphodius fimetarius</i>	1 <i>Macrodactylus subspinosus</i>
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